CLAIMS:

1. A directly modulated, distributed feedback laser having an output beam responsive to the application of an input biasing current, wherein the output response is overdamped without reducing the relaxation oscillation frequency of the laser output, so as to quickly respond to a change in the input biasing current.

2. A laser according to claim 1 in which the overdamped response is obtained by strongly gain-coupling the laser.

3. A laser according to claim 2 in which the gain coupling is sufficient to provide, in the environment in which the laser is to operate, a significant reduction in the received power penalty from a laser having less gain coupling.

4. A laser according to claim 2, in which the level of gain coupling exceeds a threshold level, whereby, in the environment in which the laser is to operate, there is a significant reduction in received power penalty from a laser with gain-coupling less than the threshold level, but no significant further reduction in received power penalty will be obtained from a laser with gain-coupling greater than the threshold level.

5. A laser according to claim 2 in which, in the environment in which the laser is to operate, the level of gain coupling is sufficient to provide a 3dB reduction in the received power penalty from a laser having no gain coupling.

6. A laser according to claim 1 in which the input biasing current is modulated at a frequency which approaches the relaxation oscillation frequency of the laser output.

7. A laser according to claim 2 in which the evironment is uncooled.

8. A method of creating a laser comprising the steps of:

(a) growing a semiconductor substrate;

(b) depositing a first doped semiconductor layer upon the substrate;

(c) creating an active semiconductor region over the first doped layer;

(d) depositing a second doped semiconductor layer having a charge opposite to that of the first doped layer upon the active region;

(e) defining an index grating which extends along the length of the semiconductor layers;

(f) selectively etching away the second doped layer and at least a portion of the active region in accordance with the layout of the index grating to a depth sufficient to produce a gain coupling sufficient to overdamp the output response of the resulting device;

(g) infilling the etched regions with doped material consistent with the composition of the second doped layer;

(h) removing the substrate;

(i) etching the semiconductor layers to a suitable width and cleaving the semiconductor layers to a suitable length; and

(j) adjusting the reflectivity of the front and rear facets so as to permit lasing to occur when a biasing signal is applied across the junctions created by the semiconductor layers,

whereby the output response of the laser is adapted to quickly respond to a change in the current level of the applied biasing signal.